

**REMARKS**

**Preliminarily, Applicants respectfully request the Examiner to return an initialed copy of "Sheet 2 of 2" of Form PTO-1449 filed February 6, 2002. A courtesy copy of the subject sheet is enclosed.**

Fig. 3B has been amended to conform to the description in the specification at pages 19 and 26, to show that oxygen introduced from the detection gas into the first measuring chamber is pumped out by the first oxygen ion pumping cell. No new matter has been added.

Allowable claims 21, 47 and 53 have been rewritten in independent form as new claims 57, 58 and 59, respectively. New claim 60 is the combination of claims 16, 19, 20 and 21, where the term "air gap" is replaced with "measurement chamber" as used throughout the specification. Same with amended claim 20. Claims 39-56 have been canceled.

Review and reconsideration on the merits are requested.

1. Claims 16, 19, 20, and 39 stand rejected under 35 U.S.C. § 102(b) as being anticipated by SAE Paper No. 970,858 to Kato et al. ("Kato");
2. Claims 16-18, 22, 23, and 42-44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by *newly cited* JP 07-116241 ("JP '241");
3. Claims 22 and 23 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. 4,676,213 to Itsuji et al. ("Itsuji");
4. Claims 17, 18, 22, and 23 stand rejected under 35 U.S.C. § 103(a) as being obvious over Kato; and
5. Claims 42-46, 48-52, 55, and 56 stand rejected under 35 U.S.C. § 103(a) as being obvious over Kato in view of *newly cited* Daniel C. Harris, *Quantitative Chemical Analysis*, (4<sup>th</sup> ed. 1995), pp. 71-73 and 137-139 ("Harris").

Applicants traverse, and request the Examiner to reconsider in view of the amendment to claims and the following remarks.

Applicants respectfully disagree with the Examiner's reasoning as set forth in the previous Office Action. Kato '858 does not disclose calibrating a sensor by determining a "zero point" (1) in atmosphere, or (2) upon cutting fuel supply, or (3) upon setting a rich air-to-fuel ratio, or (4) under certain driving conditions. Instead, Kato merely teaches that linearity of sensor response is only minimally dependent on temperature.

However, to advance prosecution and to clearly distinguish over the applied prior art, claims 16, 17, 18 and 21 have been amended to recite:

- (i) that the gas sensor is a NO<sub>x</sub> sensor;
- (ii) that the NO<sub>x</sub> sensor has first and second measurement chambers including associated first and second oxygen ion pump cells, respectively; and
- (iii) detecting oxygen concentration in a gas introduced into the first measurement chamber of the NO<sub>x</sub> sensor based on an electric current flowing through the first oxygen ion pump cell of the NO<sub>x</sub> sensor.

Apparatus claim 23 has been similarly amended.

None of the applied references discloses, teaches or otherwise suggests detecting oxygen concentration based on electric current flowing through the first oxygen ion pump cell, and calibrating a detection output of the sensor when the detected oxygen concentration assumes a value substantially the same as that in atmosphere.

For example, Kato '858 teaches a two-chamber sensor for measuring NO<sub>x</sub> concentration. Although the first oxygen pumping cell in Kato '858 lowers the oxygen concentration to a predetermined level (namely, by applying a constant potential of 300 mV across the first

pumping cell), Kato '858 does not detect oxygen concentration in gas introduced into the first chamber of the NOx sensor. Furthermore, although Kato '858 may calibrate a zero point by measuring the second pumping cell current when the NOx concentration of the measurement gas is 0 ppm (as shown in Fig. 2(a) of Kato '858), Kato '858 does not calibrate a zero point when the oxygen concentration, as detected by the first pumping cell, assumes a value substantially the same as that in atmosphere.

Itsuji et al, directed to an air-fuel ratio control apparatus, fails to disclose a NOx sensor, let alone a NOx sensor detecting oxygen concentration in a gas introduced into the first measurement chamber of the sensor based on an electric current flowing through the first oxygen ion pump cell, as required by the amended claims.

Like Itsuji et al, JP '241 directed to a performance monitor of a HC sensor also fails to disclose a two-chamber NOx sensor which detects oxygen concentration of the measurement gas introduced into the first measurement chamber based on the first pumping current. JP '241 further differs from the present invention in that it fails to disclose calibrating a zero point based on the detection output of the NOx sensor when the detected oxygen concentration assumes a value substantially the same as that in atmosphere. If JP '241 could be said to calibrate a zero point, that zero point is based on a detection output of the sensor when the fuel supply to the engine is cut-off, not when the detected oxygen concentration (the HC sensor of JP '241 does not detect oxygen concentration) assumes a value substantially the same as that in atmosphere.

For the above reasons, it is respectfully submitted that the amended claims are patentable over the cited references, and withdrawal of the foregoing rejections is respectfully requested.

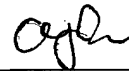
AMENDMENT UNDER 37 C.F.R. § 1.111  
U.S. Appln. No. 10/066,638

Withdrawal of all rejections and allowance of claims 16-23 and 57-65 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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